Research Statement

My research focuses on incorporating prior knowledge (especially physics-based knowledge) within data-driven models or learning process as an inductive bias, thereby achieving efficient learning from few samples or sparse observations and making the model easier to understand for scientists and non-machine-learning experts.

Education

University of Southern California  
*PhD, Computer Science*  
Advisor: Prof. Yan Liu  
Thesis: Physics-aware Graph Networks for Spatiotemporal Physical Systems

University of Michigan  
*MSc, Electrical Engineering*  
Advisor: Prof. Jay Guo

Seoul National University  
*Bachelor of Science, Electrical and Computer Engineering, Minor in Physics*  
Graduated with honors

Professional Experience

Google Cloud AI Sunnyvale, CA  
*Software Engineer*  
*June 2021 – Current*  
o Develop customized recommendations models across structured and unstructured data types that uses end to end automation to deliver expert-level model quality with minimal time and money spent.

Google Cloud AI Sunnyvale, CA (Remote)  
*Research Intern (Mentor: Sercan O. Arik)*  
*May 2020 – Feb. 2021*  
o Guided data-driven models with rules, by utilizing a novel architecture that allows learning jointly from data and rules. The new method allows the capability of having a controllable strength of the rules at inference without retraining.

Center for Data Science (CDS) at New York University New York, NY  
*Visiting Researcher (Mentor: Kyunghyun Cho)*  
*Jul. 2019 – Jan. 2020*  
o Worked on equivariant dual graph networks for spatiotemporal prediction with missing values.

Yahoo! Research New York, NY  
*Research Intern (Mentor: Changwei Hu and Yifan Hu)*  
*May 2018 - Aug. 2018*  
o Developed a deep structural model for analyzing and forecasting correlated multivariate time-series.

Visa Research Foster City, CA  
*Research Intern (Mentor: Jing Huang)*  
o Developed recommendation systems utilizing reviews on products based on attention CNN.

Publications

Conferences

- **Sungyong Seo**, Chuizheng Meng, Sirisha Rambhatla, Yan Liu, Physics-aware Spatiotemporal Modules with Auxiliary Tasks for Meta-Learning, *International Joint Conference on Artificial Intelligence (IJCAI) 2021*. 


Ashok Deb, Anuja Majmundar, Sungyong Seo, Akira Matsui, Rajat Tandon, Shen Yan, Jon-Patrick Allem, Emilio Ferrara, Social Bots for Online Public Health Interventions, *IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM)* 2018.


Workshops & Preprints


Sungyong Seo, Jiachen Zhang, George Ban-Weiss, Yan Liu, Data-driven Temporal Attribution Discovery of Temperature Dynamics based on Attention Networks, *Climate Informatics (CI)* 2019.

Sungyong Seo, Arash Mohegh, George Ban-Weiss, Yan Liu, Graph Convolutional Autoencoder with Recurrent Neural Networks for Spatiotemporal Forecasting, *Climate Informatics (CI)* 2017.


Computer Skills

**Programming Languages:** Python, C++, Matlab, Javascript

**Deep learning tools:** PyTorch, Tensorflow (TFX), PyTorch Geometric, Deep Graph Library (DGL)

Honors and Awards

<table>
<thead>
<tr>
<th>Event/Grant</th>
<th>Dates</th>
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<tbody>
<tr>
<td>ICLR Travel Award</td>
<td>2018, 2020</td>
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<tr>
<td>NIPS DLPS Workshop Travel Support</td>
<td>Dec. 2017</td>
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<tr>
<td>SIGIR Travel Award, US NSF and SIGWEB Travel Award (CIKM)</td>
<td>Nov. 2017</td>
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<tr>
<td>Travel Fellowship Award to Climate Informatics Workshop</td>
<td>Sep. 2017</td>
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<tr>
<td>USC Annenberg Graduate Fellowship</td>
<td>Aug. 2015 - Dec. 2019</td>
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<tr>
<td>National Science and Technology Scholarship</td>
<td>Mar. 2005 - Dec. 2010</td>
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